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GENERAL MEETINGS OF THE DEPARTMENTS OF THE ACADEMY OF SCIENCES

- USSR -

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## FOREWORD

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## GENERAL MEETINGS OF THE DEPARTMENTS OF THE ACADEMY OF SCIENCES

- USSR -

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### THE DEPARTMENT OF PHYSICO-MATHEMATICAL SCIENCES

The General Meeting of the Department of Physico-Mathematical Sciences was opened by a report by Academician L. A. Artsimovich which was devoted to the work of the institutions of the Department in 1959.

Results of first-order importance were obtained by Soviet scientists in the field of an entirely new discipline -- that of experimental astronomy. The speaker noted in particular the detailed studies of the so-called external radiation belt around the earth, its properties, spectrum, position in space, etc., which was discovered by our physicists. At the same time, certain important details in the structure of the magnetic field surrounding the earth were clarified, and direct measurements of the magnetic field close to the moon were made.

Investigations in the field of the physics of high-energy particles were advanced to a marked degree. In particular, valuable information was obtained on the 10-Bev synchrophasotron as the result of joint work by Soviet and Chinese physicists. The physics of high-energy particles is now acquiring a powerful base due to the rapid expansion of work on the design of new accelerating systems in the USSR.

Quantum radio physics, which was essentially conceived in our country, has begun intensive development in recent years. Very important results have been obtained in work on quantum amplifiers.

It is also necessary to note the projects on superhigh pressures and their use in the study of materials which have been developed comparatively recently in the Department.

In the field of semiconductors important results have been achieved in designing high-efficiency thermoelements. Successes have been achieved in the techniques of studying semiconductors, and new principles have been suggested for making semiconductor devices.

Research workers in the field of low-temperature physics have designed a new highly productive helium machine. Interesting work has been done on glavanomagnetic phenomena.

The most interesting of the results achieved by the astronomers was the proof of the existence and the detailed investigation of the central nucleus of the Galaxy by 3, 10, and 30-centimeter waves. New, large telescopes have been designed.

The solution of the famous "Burnside problem" by Corresponding Member of the Academy of Sciences USSR P. S. Novikov was a great achievement in mathematics. Our computer specialists have great achievements to their credit.

([See Note] The annual general meetings of the departments of the Academy of Sciences USSR were held on 22-24 February 1960.)

Geophysicists continued their studies of the ionosphere and fulfilled gravimetric and magnetic surveys in accordance with the program of the International Geophysical Cooperation. An enormous amount of data was accumulated on the physics of the sea. The effect of the liquid core of the earth on different dynamic processes was theoretically studied. The use of computers in the field of the physics of the atmosphere permits one to speak of a new way to state the problems of meteorological forecasting. New results have been obtained in the work of the long-existing problem of controlling meteorological factors.

In addition, Academician L. A. Artsimovich discussed a number of organizational problems. He pointed out, in particular, the need for improving the situation in respect to the defense of candidate and doctoral dissertations in the institutions of the Department and for reviewing developed scientific problems in order to reduce their number and to sort out the most important ones. In concluding his speech, he noted the strengthening of the international connections of Soviet physicists which was evidenced, for example, by the convocation of large international conferences on cosmic rays, physics of high-energy particles and crystallography in the USSR last year.

The members of the Department who participated in the debates on the report devoted their speeches to a number of urgent scientific and scientific-organizational problems: the design of new computers (Academician S. L. Sobolev), the development of physics in the peripheral areas, particularly in the Dagestan Branch of the Academy of Sciences USSR (Academician of the Academy of Sciences Azerbaydzhan SSR Kh. I. Amirkhanov), the improvement of techniques in observational astronomy (Corresponding Member of the Academy of Sciences USSR A. A. Mikhaylov), the intensification of research in the field of the physics of the sea (Academician V. V. Shuleykin), the new trends in work on semiconductors (Academician A. F. Ioffe), the improvement of scientific instrument manufacture, particularly spectral and optical apparatus (Corresponding Member of the Academy of Sciences USSR S. E. Frish), and the problems of the physics of strength of materials (Academician G. V. Kurdyumov).

Then, the scientific papers were given.

The paper by Doctor of Physico-Mathematical Sciences L. V. Groshev, candidates of Physico-Mathematical Sciences A. M. Demidov, V. N. Lutsenko, and V. I. Pelekhov set forth the results accomplished in recent years in the Institute of Atomic Energy on the study of gamma ray spectra occurring in the capture of thermal neutrons by nuclei. Study of the reaction  $(n, \gamma)$  and of other nuclear reactions permits one to obtain information on the mechanism of the interaction of nucleons with nuclei and on the properties of the nuclei participating in the reaction. Detailed studies of the reaction  $(n, \gamma)$  became possible only after the appearance of atomic reactors in which large streams of neutrons were produced. The reactors permit the production of very intense gamma ray sources from the capture of thermal neutrons, sources which are necessary in working with spectrometers that possess good resolution.

The paper presented the results of the measurement of gamma spectra made chiefly with a magnetic Compton spectrometer with a range of gamma ray energies from 0.3 to 12 Mev and with a resolution of about 2 per cent. Methods were also considered for the further study of gamma radiation from the reaction  $(n, \gamma)$  in thermal neutrons by means of new spectrometers recently built in the Institute of Atomic Energy and spectra measured with these instruments.

The paper by Doctor of Physico-Mathematical Sciences N. A. Dobrot was concerned with the study of elementary events of nucleon-nucleon interactions at energies of  $10^{11}$  -  $10^{12}$  ev. Physicists of all nations, including those of the USSR, the speaker emphasized, are devoting more and more attention to the study of nuclear processes in cosmic rays. The workers of the Cosmic Ray Laboratory of the Physics Institute imeni P. N. Lebedev have collaborated with Moscow University physicists to establish unique facilities in the high-altitude station in the Pamirs (at an altitude of 3,680 meters above sea-level) which make it possible to conduct detailed studies of elementary events of nucleon interactions at energies tens of times greater than those achieved in the largest modern accelerators.

The first series of experiments conducted in this installation have already indicated that if one constructs in the system of the center of mass of colliding nucleons an angular distribution of the particles born in the collisions of nucleons, one frequently observes cases in which all the secondary particles go out asymmetrically, either in the direction of the motion of the primary particle, or in the opposite direction. Measurements of the fraction of energy given the secondary particles permitted the discovery of different types of nucleon-nucleon interactions. New and highly promising ways for studying not only nuclear processes but also the structures of the elementary particles themselves have been discovered in this manner.

The design and the optical diagram of a large telescope with a diameter of 6 meters which was developed in the Main Astronomical Observatory of the Academy of Sciences USSR (Pulkovo) was the subject of the paper by Corresponding Member of the Academy of Sciences USSR D. D. Maksutov.

Use of the new telescope will make it possible to conduct detailed studies of the spectra of variable stars with the purpose of investigating the processes of liberation of nuclear energy in them. Investigations of the physics of interstellar material, the processes of star formation, and the evolution of stars are of great interest.

Academician V. V. Shuleykin told of some of the results of the work done during a five-month voyage of the research ship Sedov in the Atlantic Ocean.

As early as 1951 the speaker had advanced a hypothesis to the effect that a distorting field set up by electric currents was superimposed on the basic magnetic field of the earth. It was suggested that these currents pass through the waters of the Atlantic and Pacific Oceans and are trapped in the Arctic Ocean. The area between Africa and South America in the Atlantic Ocean was of special interest. Differences in potential caused by currents in the ocean water were registered at horizontal distances of 100 meters by an electronic potentiometer on board the same ship as long ago as 1957. The current density increased linearly with the depth. In 1959 the speaker used special photographic recording equipment in a bronze container lowered to a depth of about 2,100 meters in the vicinity of the equator to establish that approximately  $1/3$  of the existing magnetic deviation was caused by electric currents passing through the Atlantic Ocean in a north-south direction.

Hydrodynamic investigations were conducted during a voyage along the west coast of Africa which showed the presence of resonance in the currents of the summer monsoon: at a latitude of 30 degrees the so-called inertial oscillations of masses of air has a period exactly equal to the time of rotation of the earth about its axis.

On the basis of these investigations V. V. Shuleykin developed his theory of forecasting weather waves as applied to their calculation in Atlantic hurricanes.

Corresponding Member of the Academy of Sciences USSR L. M. Brekhovskikh reported on certain projects of the Acoustics Institute in regard to the propagation of sound over long distances in the atmosphere and in the depths of the ocean by means of the presence of natural wave ducts, also called sound channels. It is noteworthy that the qualitative patterns of the wave duct propagation of sound waves are very similar in the atmosphere and the ocean.

Workers of the Acoustics Institute Yu. L. Gazaryan and V. A. Polyanskaya showed that very low-frequency subsonic waves with periods varying from fractions of a minute to 5-10 minutes can

be propagated over long distances in the atmosphere. Yu. L. Gazaryan developed a strict theory on the propagation of subsonic waves and calculated concrete cases on an electronic computer.

Radiation theory can give good results in the study of underwater acoustic wave ducts. G. M. Dorskiy is developing a special electronic radiation generator in order to make investigations in this field. V. A. Polyanskiy analyzed the type of sound signal which is propagated over long distances in an underwater wave duct.

At present the development of the theory of propagation of sound waves in a wave duct whose properties change along the path of propagation is a very urgent problem. This work was started recently by L. M. Brekhovskikh and V. A. Yeliseyevnin.

Peculiarities of the structure of silicates with large cations were elucidated in a paper given by Academician N. V. Belov. He pointed out that the classical studies of the 1930's constitute only the first chapter in the crystal chemistry of silicates which was devoted to silicates with small cations (Mg, Fe, Al). The fundamental ideas of the second chapter of the crystal chemistry of silicates were developed from an analysis of structures containing large cations. It was established that the chief role in the structure of silicates is not played by silicon oxide radicals which form its strong but flexible elements, but by cations whose size is determined by the size of the corresponding octohedrons; the silicon oxide tetrahedrons, united in this or that radical, accommodate themselves to the rigid architectural designs of these octohedrons. The edges of the octohedrons of large cations (Na, Ca) are commensurable with the altitudes of the  $\text{Si}_2\text{O}_7$  diortho groups whose presence is characteristic of the silicates of the "second chapter".

The speaker examined from a single viewpoint the structure of cement silicates, silicates containing Zr, Ti, Ta, Nb, Mn, Tl, and glasses.

The paper presented by Doctors of Physico-Mathematical Sciences V. I. Krasovskiy and I. S. Shklovskiy described investigations of the emissions of the upper atmosphere which were conducted in recent years in the Institute of the Physics of the Atmosphere of the Academy of Sciences USSR. These studies throw new light on the energetics of the upper atmosphere. Their success was ensured by the use of new, improved spectroscopic apparatus, particularly contact electron optical transducers which permitted amplifying the photographic image. A wealth of material was accumulated on the spectroscopy of night sky and the aurora which makes it possible to reveal the varied microprocesses which occur as a result of photodissociation, ionization, and recombination under the action of hard ultraviolet, x-ray, and corpuscular radiation from the sun and also many macroscopic processes and characteristics of the upper atmosphere. The intrusion of electrons and protons into the earth's atmosphere was discovered even in the absence of visually observable auroras.

It was established by the width of the spectral lines and a number of other peculiarities of the spectra that the temperature of the upper atmosphere increases over high-latitude regions and that it grows by thousands of degrees during displays of the aurora. It was discovered with the aid of the third artificial earth satellite that there is an increased concentration of high-energy electrons with energies of about 10 kev at altitudes of over a thousand kilometers which are responsible for the intense heating of the upper atmosphere. It was shown that the electrons and protons observed there cannot be primary products ejected from the sun -- they appear as the result of the complicated interaction of primary solar corpuscular streams with the earth's magnetic field.

Candidate of Physico-Mathematical Sciences V. I. Stafeyev stated in his paper that the theoretical and experimental investigations of the properties of p-n junctions in germanium conducted in the last few years in the Physical Engineering Institute of the Academy of Sciences USSR have permitted suggesting and experimentally verifying some new principles in the operation of semiconductor devices.

The most interesting of them, the L-diode, is based on the use of the properties of unbalanced carriers in semiconductors. Use of the dependence of lifetime on concentration permitted designing diodes with forward negative resistance. The dependence of lifetime on light made it possible to propose a new mechanism of photoconductivity whose action was possible in principle only in the presence of dark conductivity. Experimental success was achieved in making L-diodes with large positive (with forward current) and negative (with back current) photoconductivity. Photosensitivity reached many tens of amperes per lumen.

The theory developed on the behavior of semiconductor diodes in magnetic fields permitted making diodes in which the change in current in a magnetic field exceeded the change in the resistance of the original semiconductor by hundreds of times under the same conditions.

Since their terms of office had ended, the scientific secretary and the Bureau of the Department were re-elected to office at the General Meeting. Academician L. A. Artsimovich was elected scientific secretary. The following were elected to the Bureau: Academicians G. V. Kurdyumov (deputy scientific secretary), A. I. Alikhanov, M. A. Leontovich; Corresponding Members of the Academy of Sciences USSR L. M. Brekhovskikh, S. N. Vernov, S. V. Vonsovskiy, B. P. Konstantinov, A. A. Markov, M. D. Millionshchikov, A. A. Mikhaylov, E. R. Mustel', B. M. Pontekorvo [B. M. Pontecorvo], Yu. V. Ryznichenko, I. R. Shafarevich.



## The Department of Chemical Sciences

Academician A. P. Vinogradov gave the report on the scientific and organizational-scientific activities of the Department of Chemical Sciences in 1957-1959.

During 1958 the Department reorganized its work and concentrated its attention on priority problems.

The first of these, the chemistry of high-molecular compounds, was linked with the adjoining fields of organic, inorganic, and physical chemistry and also with problems in physics, biology, and engineering. Thus, rapid progress in polymer chemistry naturally called for intensified development of all those branches of knowledge. While the main efforts in 1958 were directed toward organization, it was possible to carry out research on a new scale in 1959 when the basic part of this organizational work was completed. The number of scientific workers occupied with investigations in the field of polymer chemistry increased approximately three times in these two years within the framework of the Department alone. Two new institutes were established. The chief objective of one of these institutes, the Institute of Petrochemical Synthesis, is the production of new polymers based on natural gas and oil; and of the other, The Institute of Chemistry of Natural Compounds, is the study of biologically important substances where compounds with high molecular structures predominate. The Institutes of High-Molecular Compounds, Organo-Elemental Compounds, and Organic Chemistry imeni N. D. Zelinskiy have expanded their work in this field to a considerable extent. Studies on this subject were set up for the first time in the Institutes of Chemical Physics, Physical Chemistry, General and Inorganic Chemistry imeni N. S. Kurnakov, and Electrochemistry.

It should be added here that a number of projects have acquired a significant development in the branches of the Academy of Sciences USSR and an institute of this type was established in one of these branches (the Kazan' Branch). Moreover, similar institutes have been or are being organized in the academies of the union republics (Uzbekistan, Azerbaydzhan, and Ukraina), to say nothing of the fact that special departments and laboratories in many institutes belonging to these academies are already working in this field. In addition, a large number of branch institutes are investigating polymers.

Investigations in this field were conducted in the institutes of the Academy of Sciences USSR and its branches with the chief objective of producing polymers with high technological properties. In particular, heat-resistant materials of organo-metallo-siloxane character, which are the semifinished products in the manufacture of plastics and adhesives (the Institute of Organo-Elemental Compounds), are being introduced into industry. A technological

procedure has been worked out for the polymerization of a polymer of the "pentone" type which is distinguished by high thermal and chemical stability, mechanical strength, and the absence of shrinkage during forming (Institute of High-Molecular Compounds). Pilot plant operations are in progress to check a method for obtaining polyformaldehyde (Institutes of Chemical Physics and Petro/Chemical Synthesis). Polymers (polybutane, polyisobutylene, polyvinyl cyclohexane) which have high melting points, elasticity, and strength, have been produced in the Institute of Petro/Chemical Synthesis.

The results of a number of studies have great prospects. Thus, new polymers have been synthesized which contain phosphorus - nitrogen, boron - nitrogen, and other bonds, also high-molecular compounds with chelate bonds whose principal chain contains zinc, copper, cadmium, nickel, and other similar metals. Catalytic systems have been discovered which open new ways for the synthesis of such valuable elastomers as cis-polybutadiene and cis-polyisoprene (Institute of High-Molecular Compounds). Projects on the synthesis of polymers with new electrophysical properties have acquired significant development in several institutes.

Projects for establishing the theoretical principles of the chemistry of high-molecular compounds are being expanded, and studies have been started on protection of polymer materials from aging.

The chief institute designated to work on problems in the field of the chemistry of natural compounds was established in 1959; therefore, its projects are still far from being fully developed. Projects in this field have also been set up in other institutes. Thus, the study of the participation of free radicals in biological processes, the discovery of magnetoactive compounds in living tissues, and the search for new organic carcinogenic substances are being conducted in the Institute of Chemical Physics. New carcinogenic peptides and other substances which possess protective properties against ionizing radiation have been produced in the Institute of Organo-Elemental Compounds.

A number of investigations have been completed in the chemistry of semiconductors. Compounds have been obtained which are light-sensitive in the infrared region; a quantum mechanics method of molecular orbits has been applied to the calculation of dielectric properties (Institute of General and Inorganic Chemistry imeni N. S. Kurnakov). Semiconductor glass has been developed on the basis of phosphorus anhydride (Institute of Silicate Chemistry). The Department was faced with the very important problem of developing methods for producing extremely pure silicon and quartz, but practically nothing has been accomplished here.

Some results have been achieved in the field of the study of rare elements. For example, a method has been worked out for separating pure selenium (Institute of General and Inorganic Chemistry imeni N. S. Kurnakov), as well as methods for determining the amount of gases in all metals down to uranium, inclusive (Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy).

All institutes are occupied with problems of the theory of chemical structure, kinetics, and reactivity. About 10,000 new compounds have been synthesized in the institutes of the Department during the report years. On the other hand, however, theoretical work lags far behind synthesis.

Interesting results have been obtained in the field of the kinetics of chain reactions (radicals), particularly oxidation reactions (Institute of Chemical Physics), homolytic isomerizations (Institute of Organo-Elemental Compounds), and radiation chemical reactions in the solid phase at low temperatures (Institute of Chemical Physics). Investigations in the kinetics and mechanism of heterolytic reactions in solutions are progressing on a smaller scale. At the same time, special attention is being devoted to data obtained from studying reactions of carbon ions and reactions of acid-base catalysis which are closely related to them (Institutes of Organo-Elemental Compounds and Physical Chemistry), and also tautomeric transitions (Institute of Organo-Elemental Compounds). Only three small groups of scientists are working in the field of quantum chemistry. No searches are in progress for new methods of calculation, and electronic computers are not utilized adequately. Wide use is being made of all sorts of optical spectroscopy and the method of electron paramagnetic resonance in the study of structures, while the method of nuclear magnetic resonance is not used as yet. Likewise, relaxation methods are not being used in the study of rapid chemical reactions.

The recently organized Institute of Electrochemistry has been conducting investigations on a background of extensive theoretical studies on the development of new sources of electric current. As a result, the development of hydrogen-oxygen cells has been advanced to a considerable extent.

Investigations on the physico-chemical principles of heat resistance and mechanical strengthening of metals and alloys have been completed in the Institute of Physical Chemistry. It has been established that these materials lose their strength at a sharp rate when the thinnest films of liquid metals with low melting points are applied to their surfaces; this is linked with a sharp reduction in the surface energy on the boundary of the solid metal and the melted metal.

The kinetics of the adsorption and catalytic processes in semi-conductors and metals has been developed in the field of the scientific principles involved in selecting catalysts, taking

into account charges and inhomogeneities on the surfaces (Institutes of Organic Chemistry, Physical Chemistry, and Petro/Chemical Synthesis).

The study of geochemical processes under high pressures and at high temperatures equivalent to those existing in the earth's crust has acquired a high state of development. Isotopes of carbon, oxygen, sulfur, and inert gases have been used to evaluate the genesis of different types of rock.

After discussing a number of organizational problems, Academician A. P. Vinogradov concluded by pointing out that there was insufficient coordination in the research projects conducted in the Department.

It is the opinion of Doctor of Chemical Sciences R. D. Obolentsev that, when reporting on the work of the Department, one should indicate the background of the activities of other Soviet scientific establishments which are conducting research in the field of chemistry. Such information would make it possible to offer more concrete criticisms which would contribute toward improving the work of the Department.

Academician V. I. Spitsyn and Doctor of Chemical Sciences A. A. Trapeznikov pointed out that there was inadequate liaison between the Department and the institutes. Trapeznikov, who was joined by Corresponding Member of the Academy of Sciences USSR N. M. Zhavoronkov, emphasized that the Bureau of the Department has not carried out its resolution to arrange visiting sessions in the institutes. They recommended that the new members of the Bureau correct this shortcoming and hold such meetings more often, particularly to discuss the annual reports of the institutes.

Corresponding Member of the Academy of Sciences USSR Yu. G. Mamidaliyev noted the insufficient attention given by the Department to problems connected with introducing the results of research into industry which was particularly clearly expressed in the fact that such questions rarely arose in the general meetings. It would be well, for example, to discuss proposed projects which would make it possible to supply our industry with aromatic hydrocarbons which are of very great importance in the development of the production of polymers. Doctor of Chemical Sciences V. I. Mikheyev pointed out the inadmissibility of delaying the introduction of the results obtained from research into the national economy.

Academician A. N. Frumkin and Doctor of Chemical Sciences A. A. Trapeznikov believe that the Academy of Sciences must organize its own large experimental workshops for manufacturing instruments. Corresponding Member of the Academy of Sciences USSR I. P. Alimarin spoke in favor of the organization of a special branch of industry which would produce laboratory equipment for all branches of scientific research. Corresponding Member of the Academy of Sciences USSR B. V. Deryagin recommended that the Academy be left

only those projects connected with the designing of instruments which require new scientific ideas or new principles of measurement. Academician V. I. Spitsyn spoke on the necessity for increasing labor productivity of scientific co-workers by extensive application of mechanized and automated apparatus.

Academician A. N. Frumkin noted the expedience of a considerable expansion of projects on the chemistry of semiconductors. He believes that a special building equipped in accordance with the requirements of modern technology and the most highly perfected apparatus will be needed to carry out these projects.

In his concluding speech Academician A. P. Vinogradov acknowledged that the criticism was just. He suggested that the Department review the questions raised in an objective manner, in particular, those connected with the introduction of completed projects, and that this review be made in future meetings of the Department.

Then, elections were held for membership in the Bureau. N. N. Semenov was elected scientific secretary and the following were elected to membership in the Bureau: Academicians B. A. Arbuzov, A. P. Vinogradov, M. M. Dubinin, V. N. Kondratyev, I. V. Tananayev, A. N. Terenin, A. N. Frumkin, M. M. Shemyakin, and also Corresponding Members of the Academy of Sciences USSR I. P. Alimarin and N. M. Zhavoronkov.

#### The Department of Geological and Geographical Sciences

The report on the results of the work of the establishments of the Department in 1959 was given before the General Meeting of the Department of Geological and Geographical Sciences by Academician D. I. Shcherbakov. The speaker emphasized that in our times the objectives of many natural sciences, including geology and geography, are changing due to the growth in the needs of human society and the rapid development of technology. Although these sciences had previously studied and established principally the patterns of the course of natural phenomena in separate regions of the earth without sufficient explanation of mutual ties between them, now they were endeavoring to include the earth as a whole, thus acquiring, so to speak, a global character. This is why the problem dealing with patterns of worldwide scale have become exceedingly urgent now.

D. I. Shcherbakov continued that he wished to dwell only on some of the largest projects which show that our scientific groups can solve larger and more important problems in geology and geography. Those are the problems which await the attention of the academic establishments and which reproach us, not for leaning toward practical work, but for petty subjects which have remained outside the fundamental course of the large scientific problems.

First of all, it is necessary to mention the research which has brought about a fundamental change in our views on the history of the earth and which will have great significance in the development of a number of adjoining fields of natural science. These investigations include, among other, the work done on breaking up the Pre-Cambrian Era, which was done by our stratigraphers and research workers concerned with the absolute age of geological formations. The separation of formations of the Upper Precambrian into a special group of reef deposits was a particularly important result of this work. The work done in the Academy laboratories on determining absolute age based on an analysis of the products from the decay of calcium in glauconites of sedimentary rocks and in the micas in magmatic rocks have made it possible to draw extensive conclusions concerning geological order.

Investigations of a most important problem, that of studying the patterns of the distribution of deposits of useful minerals, have acquired an exceedingly large scope. These projects have brought to life a number of new trends in investigative procedure which have grown into independent problems. This is especially true of the science of geological formations which has made significant advances in respect to theoretical considerations concerning the paragenetic connections of rocks and also the general theory of the formation of deposits in which important progress has been achieved.

In 1959 intensive work was continued on regional tectonics and on the compilation of tectonic maps in The Geological Institute. The compilation of a tectonic map of Europe on a scale of 1:2,500,000, which was undertaken at the initiative of the USSR and is being done on an international scale, is now being completed. In addition to mapping the tectonics of the territories of the USSR, Soviet geologists have had to compile tectonic maps for a number of foreign nations; they have done this successfully.

The tectonic map of the Arctic segment of the earth on a scale of 1:7,000,000, whose compilation was undertaken to clarify the structural ties between Eurasia and America and to solve the problem of the tectonic nature of the bottom of the Arctic Ocean, has been completed. Marked progress has been made on a tectonic map of Eurasia on a scale of 1:5,000,000 which is being compiled jointly by Soviet geologists and geologists from the Chinese Academy of Sciences. The first models have already been prepared for most of the territory included in this map. The compilation of tectonic maps of the extensive territories of Europe and Asia have compelled new approaches to many fundamental problems of the tectonic development of the earth's crust.

Work was also continued on more detailed tectonic maps of individual regions of the USSR. The tectonic map of the entire Tura Lowland was completed, and a very interesting tectonic map of the northeastern Russian platform was compiled. In response

to inquiries which has been received, both of these maps were sent out to a number of local geological organizations to be employed in planning prospecting projects.

In passing on to the geographical projects of the institutions of the Department, D. I. Shcherbakov pointed out that they were of an extensive and complicated character, ranging from climatology and geomorphology to biogeography and economic geography and corresponded, on the whole, to the modern status and problems of the geographical sciences.

The principal part of the work of the geographical section is connected with investigations of the temperature and water conditions of the earth's surface and their role in the dynamics of natural processes. These problems have become some of the most important theoretical tasks of the Department. The use of modern geodetic and geophysical methods has become characteristic of the scientific projects of this type and a close connection has been maintained with the practical needs of reclamation, hydraulic engineering, and mining construction in many cases.

The Institute of Geography has done important scientific work on the geographical description of the economic regions of our country and on the geography of foreign countries. One should make special mention of the joint projects of the Institute with Chinese, Rumanian, and Bulgarian geographers in the compilation of large scientific monographs on these countries.

Soviet oceanographers have directed their efforts toward the overall study of different seas and oceans. Large-scale studies are now in progress on board the research ship Vityaz' in the Indian Ocean. The principal objective of all oceanological projects is the overall study of the nature of the oceans and their resources (food, chemical, and power) with the purpose of using the data obtained in the national economy and navigation.

The cryologists of the Academy of Sciences have clarified the laws of the formation of permafrost soils and rock and of accumulations of ice and snow extending over many years; they have studied ways to utilize them in the national economy and to combat their harmful effects.

In describing the organizational activities of the Department, D. I. Shcherbakov pointed out that his institutes and laboratories had been greatly improved in recent years and had taken shape as genuine scientific institutions. Laboratory facilities were markedly strengthened, and new cadres of research workers had been developed. A great deal of work has been done on the selection of the more important problems which would place a limit on the further development of numerous, scattered problems, making it possible to concentrate our efforts on the most important scientific fields. However, there are still some important shortcomings in this respect. Their small direct participation in the conduct of overall interdepartmental

research and the lack of coordination in projects concerned with the principal fields and problems also constitute a weakness in the institutes of the Department. Improvement of coordination and the establishment of joint research will facilitate the development of ties between the institutes of the geological and geographical sections and the institutes belonging to other departments of the Academy, and with the academies of sciences of the union republics; this will make it possible to strengthen the influence of modern ideas of physics and chemistry, which exert a decisive effect on the further growth of all the natural sciences, within the walls of the geological institutions. In order to achieve a sharp improvement in the ties with practical work, it is necessary to recommend the development of the chief problems jointly with specialists of other establishments, including industrial, and also to secure more personal contact between the leading scientists of the institutes and the scientific workers of those organizations which are solving practical problems. The strengthening of experimental facilities is likewise a very important problem.

D. I. Shcherbakov directed attention to the fact that paleontology, geochemistry, and geophysics were not being developed in the Department of Geological and Geographical Sciences, but in the institutes of other departments and that this constitutes an important organizational defect. This creates a definite gap between the investigations of a single group of sciences of the earth and its history and at times hampers the conduct of projects on problems which should be solved by geologists together with paleontologists, geochemists, and geophysicists. In this connection, the speaker is of the opinion that the question of the status of a number of institutes in the structure of the Academy of Sciences USSR should be reviewed.

In conclusion, D. I. Shcherbakov emphasized that the scientific workers of the establishments of the Academy of Sciences USSR were responsible not only for improving the work of the academic institutes but also for the proper development of geological and geographical sciences in the USSR as a whole.

The following persons took part in discussing the report: Academician I. P. Gerasimov, K. I. Satpayev, N. S. Shatskiy, and A. L. Yanshin; Corresponding Members of the Academy of Sciences USSR A. A. Amiraslanov, V. V. Belousov, S. V. Kalesnik, M. F. Mirchink [sic], L. V. Pustovalov, P. F. Shvetsov, Doctor of Geographical Sciences V. G. Kort, Doctor of Geological and Mineralogical Sciences F. A. Makarenko. The speeches were devoted to problems connected with the organizational structure and the strengthening of the Department of Geological and Geographical Sciences. Opinions were expressed on ways for developing Soviet geology, in particular the further study of the processes of ore formation and the formation of sedimentary rocks. The majority



of the speakers supported D. I. Shcherbakov on the necessity for developing research on paleontology, geochemistry, and geophysics in the Department of Geological and Geographical Sciences.

After discussing the report, the participants in the General Meeting listened to the scientific papers which were presented. The first of these, on the geochronology of the Precambrian rocks of the Baltic Shield, was presented by Academician A. A. Polkanov and Professor E. K. Gerling. The authors suggested an entirely new geochronological division of the Precambrian formations of the Baltic Shield (including Finland, Sweden, and Norway) on the basis of about 550 determinations of their absolute age, made by the potassium-argon method in the Laboratory of Precambrian Geology of the Academy of Sciences USSR. The geological development of the territory of this shield was followed from the Katarchean (3,500 million years), whose formations are the oldest in the world, up to the Lower Paleozoic (620 - 400 million years).

The change in the principles of division and determination of the relative age of the ancient Precambrian rocks constituted one of the most important conclusions of the paper. This division was made formerly on structural relationships and in accordance with the degree of metamorphosis of the rocks. It was considered that the more the rocks were metamorphized, the older they were. In the light of the determinations of absolute age, it turned out that this proposition was incorrect. Normal sedimentary rocks which would have been considered considerably younger by the degree of their metamorphism were discovered among the oldest Katarchean formations. At the same time the highly metamorphized gneisses of Southern Sweden proved to be comparatively young and to belong to the reef group of formations. Rocks of very different degrees of metamorphism turned out to be of the same age.

A long series of geosyncline cycles of development was traced in the Precambrian shield, each of which had a duration that did not exceed the durations of the geosyncline cycles of the Paleozoic Era or, in general, those of later eras in the history of the earth. The authors of the paper believe that this indicates that the tectonic life of the earth in the earlier stages of the existence of its crust did not differ fundamentally from that which we observe in later ages. In the light of the new data, the gradual expansion of the area of the consolidated Baltic Shield is well traced out.

Corresponding Member of the Academy of Sciences USSR G. D. Afanasyev presented a paper on the problems of studying the deep zones of the earth's crust. As the speaker pointed out, investigations of the structure of the earth's crust are of importance in the clarification of the laws of formation of useful minerals, the causes of volcanic activity, earthquakes, et cetera. As a result of geophysical investigations based on studies of the velocity of

passage of seismic waves and anomalies in the force of gravity at different sectors of the earth's crust, there is no doubt now that the velocities of propagation of elastic waves in the crust are different, and two types have been separated on this basis -- continental and oceanic. As a result of an analysis of the factual data accumulated, the speaker has come to the conclusion that the upper parts of the earth's crust do not have the same physical properties in the regions of the continents and the oceans, but there could scarcely be fundamental differences in the sense of the petrographic composition of the rocks underlying them. The regions of the earth's crust which are now, in this geological period, covered by ocean waters are characterized by higher velocities of elastic waves as compared with the regions of the earth's crust occupied by continents. It is the opinion of the authors that this is because the rocks of the earth's crust in the deep parts of the oceans have been subjected to the additional pressure of the column of ocean water for many tens and hundreds of millions of years.

The paper by Corresponding Member of the Academy of Sciences USSR N. G. Kell' on the importance of aerial methods in geological and geographical studies developed the idea expressed by A. Ye. Fersman more than 30 years ago to the effect that the breadth of the problems which could be solved by aerial methods would require the breadth of approach to aerial methods now accorded it by aerial geophysicists. The successful application of aerial methods is connected with improvements in photographic processes, with studies of the spectral brightness of objects in aerial photographs, and with the overall study of the photogrammetrical aspects of aerial photography with the use of electronics and radio engineering. The special deciphering of aerial photographs, their detailed study and interpretation are very important and at times are of decisive importance. The speaker told in detail of the work experience of the Laboratory of Aerial Methods of the Academy of Sciences USSR.

The paper presented by Senior Scientific Worker of the Geological Institute of the Academy of Sciences USSR Yu. M. Pushcharovskiy was devoted to the large tectonic map of the Arctic which he compiled in 1959. The map was compiled in accordance with the principles worked out by its editor, Academician N. S. Shatskiy; that is, the tectonic structures in it were systematized according to the age of the folding. This was the first map of its kind for the Arctic segment of the earth; it was compiled with a polar cartographical projection on a scale of 1:7,000,000, which permits a much more detailed picture of the peculiarities of the structure of the earth's crust in the Arctic region than the previous small charts.

One's attention is struck by the wide prevalence of ancient platforms in the Arctic. Apparently they occupy wide areas even under the waters of the Polar Basin. One of them is located in

the region of the Barents Sea while the other, which is larger, is located in the region of the East Siberian Sea and the Beaufort Basin. These platforms are divided by a folded zone which passes through the Lomonosov Ridge and connects the tectonic structures of Northeastern Asia and the Canadian Arctic Archipelago which are very similar. The tectonic map permits one to consider that the ocean depths of the Arctic Ocean constitute secondary formations which occurred on the previously existing platform. In other words, the structure of the earth's crust which is characteristic of the deep-water basins, in particular the insignificant thickness or the absence of the sill layer, can occur in the process of the tectonic development of regions which are varied in their origin and original structure.

The participants at the meeting also heard a paper by Academician I. P. Gerasimov on the scientific results of the Third Congress of the Geographical Society of the USSR. ([See Note] An article on the Congress is published on page 102 of this issue of the journal.)

The scientific secretary and the Bureau of the Department of Geological and Geographical Sciences were re-elected during the meeting. D. I. Shchepetnikov was elected scientific secretary. The following were elected to the Bureau of the Department: Academician A. A. Grigor'yev, Corresponding Member of the Academy of Sciences USSR I. I. Gorskii, Doctor of Geographical Sciences G. A. Avsyuk (deputy scientific secretary), Academicians I. P. Gerasimov, D. S. Korzhinskiy, K. I. Satpayev, A. A. Trofimuk, N. S. Shatskiy, A. L. Yemshin; Corresponding Members of the Academy of Sciences USSR Kh. M. Abdullayev, A. A. Amiraslanov, G. D. Afanas'yev, K. A. Vlasov, L. S. Zenkevich, M. F. Mirchink, V. I. Smirnov, F. V. Chukhrov; Doctors of Geographical Sciences V. G. Kort and P. A. Shumskiy.

#### The Department of Biological Sciences

The paper given by Corresponding Member of the Academy of Sciences USSR N. M. Sisakyan, who presented the basic results achieved in 1959 by the biological institutions (including corresponding institutions of the branches of the Academy of Sciences USSR) along the lines approved by the preceding Annual Meeting of the Academy, was devoted to a report on the activities of the Department of Biological Sciences. Thus, the new data which made it possible to clarify the physico-chemical and structural bases of life processes were enumerated in the paper. For example, the regulating effect of water-insoluble sterols and desoxyribonucleic acid on enzymes was established, the fact that the whole macromolecule of native virus ribonucleic acid is formed by one high-polymer, continuous polyribonucleotide chain was proved, and phospholipids of a new

type were observed in chloroplasts and leucoplasts. New data on the ultra-structural organization of cells and tissues and on the mechanisms of the effect of nuclear radiation on living organisms are of great interest. The new Institute of Radiation and Physico-Chemical Biology, where a number of original devices for scientific research have been designed, has developed its work on a wide scale.

Studies conducted in close collaboration with industrial institutes and enterprises of the national economic councils on problems connected with the processing and preservation of products of biological origin (particularly with respect to the storage of unprocessed liquids) have produced valuable results. The discussion contained in the paper on the problem of controlling the heredity and the vitality of plant and animal organisms noted, in addition to the well-known achievements in the development of a herd of cows with a high percentage of fat in their milk, the development of a fast-maturing variety of corn, the Gorki Leninskiye.

Data were obtained in the course of work on problems of controlling the metabolism of microorganisms which helped to determine the paths of the biosynthesis of antibiotics and to solve a number of problems of practical significance; for example, it turned out that it was more expedient to use cultures of nonsporogenous bacteris rather than sporogenous bacteria as bacterial fertilizer.

Certain results of the work on the physiology of animals and man, on photosynthesis, on the nourishment and development of plants, on the study and the mastery of the natural resources of the country (the soils, the vegetation cover, the animal world), on the struggle with harmful plants and animals (in particular, the development of a method for protecting plants from harmful insects with activated oreolin), on the control of various helminthiases (the study of the biological cycles of pathogenic helminths, the study of phytonematodes, et cetera) are of theoretical as well as of definite practical interest.

A new problem has been distinguished, that of "hydrobiological processes and ways to control them," in which the basic part is the study of the biological productivity of bodies of water. This problem is attracting more and more attention. In connection with works on this problem, the edition of the Zhizn' Presinykh Vod SSSR [Life in the Fresh Waters of the USSR] which has been in preparation for more than 20 years, was completed last year. This work will surpass all analogous foreign works in content and in size. A great amount of work has also been done on determining the coefficients of accumulation of radioactive substances by different water organisms.

In compliance with the resolutions of the Twenty-First Congress of the CPSU, the institutes of the Department increased the application of the achievements of physics, chemistry, and other sciences to biological research. Work in the field of x-ray

structural analysis acquired independent significance, and the method of electron paramagnetic resonance was mastered. This method was used to study, in particular, the connection between the reactions of respiration and photosynthesis, which, as the speaker emphasized, marks the transition of plant physiologists from studies of the general picture of photosynthesis to clarification of the most minute aspects of the process. In the study of cortical-subcortical relationships, electronic computers were employed for the first time in analysis of electroencephaloscopic data, which permitted the discovery of very minute changes in the central nervous system. Experiments have been conducted on the artificial cross-linking of soils with different polymers.

During the period covered by the report, the results of 43 projects were put into practice. Mobilization of the results of certain large projects permitted the Department to prepare and to present to administrative agencies a number of suggestions of great practical significance (on the cultivation of solonchaks lands, on the struggle with erosion, on the production of vitamin B<sub>12</sub> for the needs of animal husbandry, et cetera). Noting the well-known shifts in the work connected with introducing the results of scientific activity into practice, the speaker pointed out that the institutions of the Department still did not devote sufficient attention to projects with direct application to practical work, and underestimated the significance of the plans for introduction into practice.

Scientific-organizational activities were given a large place in the paper. During the period covered by the report, the Bureau did a great amount of work to ensure a review of the projects of the scientific establishments of the Department and to bring them closer to the objectives set by the Twenty-First Congress of the CPSU and to ensure the implementation of a number of measures to render scientific assistance to agriculture. In 1959 the Bureau began to hold local meetings. Meetings were held in Leningrad, in the Institute of the Biology of Water Reservoirs (In Bork), in the Soil Institute imeni V. V. Dokuchayev and in the Institute of Microbiology. The Bureau arranged a number of joint meetings with the VASKhNIL [Vsesoyuznaya Akademiya Sei'skokhozyaystvennykh Nauk imeni V. I. Lenin - All-Union Academy of Agricultural Sciences imeni V. I. Lenin] and the Academy of Medical Sciences USSR in which prospective plans and different fundamental problems of the development of scientific research were discussed. Plans for joint projects with the Academy of Medical Sciences USSR were discussed with respect to such problems as malignant growths, radiation and physico-chemical biology, proteins and their physiological functions.

Scientific councils are markedly more active than in previous years and have done work in coordinating research and interchange of information between scientific establishments by calling conferences, meetings, and discussions of plans and results of scientific research.

However, not all of them fulfill the role which has been assigned to them (they do not organize joint research projects with institutes belonging to different departments; they do not take the necessary measures to establish close contacts between those who are doing work on different parts of problems, etc.).

During the year covered by the report the institutes of the Department strengthened their foreign ties (including those with the countries of Asia and Africa), but the results are still not adequate. The speaker discussed the publishing activities of the Department and the work done in training cadres in 1959 and stated that 6,354 square meters of work space had been put into operation during the past year in construction projects of the Department.

Then Academician V. N. Sukachev presented a report in which he briefly analyzed the activities of the members of the Department in 1959.

The participants in the meeting also heard a paper "On Measures for Improving Scientific Propaganda" which was read by the scientific secretary of the Department, Doctor of Biological Sciences A. A. Spasskiy.

A number of the biological institutions of the Academy gave serious attention to the propaganda of scientific knowledge: the Botanical Institute imeni V. L. Komarov, which sent its scientific workers out on frequent trips to enterprises to read lectures; the Institute of Physiology imeni I. P. Pavlov, which organized the "University of Health" in the club of one of the Leningrad factories; the Institute of the Biology of Water Reservoirs, whose scientific workers read 200 lectures during the year, many of them in rural settlements; the Institute of Genetics, which received more than 200 excursions in 1959 at its experimental base in the Lenin Hills; the Institute of Plant Physiology imeni K. A. Timiryazev, which detailed three of its scientific workers every day to act as duty excursion guides to its artificial climate station.

Scientific societies included in the Department are carrying on significant propaganda work. However, as stated previously, the status of scientific propaganda still does not meet modern requirements throughout the Department as a whole. More active participation on the part of the scientists of the Department in the activities of the All-Union Society for the Promotion of Political and Scientific Knowledge is necessary; greater attention to the problems of scientific councils of the institutes.

Twenty persons took part in discussing the papers.

Those who spoke stated their satisfaction with the favorable changes in the work of the Department and of its Bureau (the concentration of attention and efforts on the most urgent problems of science, the establishment of contacts with other departments of the Academy and the agencies of the State, the strengthening of

ties with practical work, etc.). At the same time, different suggestions were made with regard to further improvement of the activities of the Department.

One of the problems mentioned by almost all those who spoke was the training and advancement of young scientific cadres. The speech, made by Candidate of Biological Sciences G. K. Skryabin, was devoted in particular to the problem of working with young people. Interest was aroused by the speech made by Corresponding Member of the Academy of Sciences USSR S. Ye. Severin, who expressed the opinion that scientific societies which ensured free encounters between scientists of different ranks should play a large role in activating the participation of young people in discussing scientific problems and in scientific life in general. Many of those who spoke (Academicians V. A. Engel'gardt, Ye. N. Pavlovskiy, Corresponding Member of the Academy of Sciences USSR E. A. Asratyan, Professor P. S. Kupalov, Doctor of Biological Sciences Ye. V. Budnitskaya, and others) supported S. Ye. Severin in his appeal for closer ties between the activities of the institutes with the societies, which is important not only for the successful solution of many scientific problems, but also for the approval of the results obtained and the improvement of scientific information.

The problem of introduction of scientific achievements also occupied a large place in the speeches. The necessity was mentioned first of all of organizing experimental testing and of further improving the results of scientific research under production or pilot plant conditions (Corresponding Members of the Academy of Sciences USSR I. I. Tumanov, V. N. Chernigovskiy, and others).

Some of the speakers discussed the activities of individual scientific institutions (Academician N. V. Tsitsin, Corresponding Member of the Academy of Sciences USSR P. A. Baranov, Doctor of Biological Sciences A. S. Troshin, Doctor of Agricultural Sciences A. B. Zhukov, Candidate of Geological and Mineralogical Sciences N. A. Komarova, and others); others spoke of the problems connected with the material-technological base for modern research (Doctor of Biological Sciences G. M. Frank, Professor L. A. Tumerman); others told of detached duty to foreign nations and ties between Soviet biologists and foreign nations (Academicians K. I. Skryabin, I. S. Beritashvili, Doctor of Biological Sciences M. S. Gilyarov); and still others discussed the publishing activities of the Department (Corresponding Member of the Academy of Sciences USSR Ye. N. Mishustin, and others).

The General Meeting unanimously adopted a resolution approving the activities of the Bureau and pointed out the great work of the Department in revising the plans of its scientific institutions on the basis of the decisions of the Twenty-First Congress of the CPSU.

Three scientific papers were presented at the final session.

Doctor of Biological Sciences G. M. Frank gave a paper entitled "Structural and Ultra-structural Lability and Its Functional Significance" in which he examined the problem of the role of the microlability of cellular structures and vital activities. As shown in the laboratory which he heads, the propagation of stimuli by a nerve is connected with the propagation of a wave of elastic, volumetric changes in the substrate of the nerve fiber, which was detected by an interference method. The same method applied in the study of nerves in a quiet state permitted the establishment of the presence of spontaneous, wave-like vibrations in the surface of the nerve which disappeared when it died. Spontaneous, rhythmic microlability turned out to be characteristic of other excitable tissues (the nerve ganglia of insects, et cetera).

Ultralow frequency (approximately of the same periodicity as that of the microlability) oscillations of the electrical potential in the tissue of the brain and spontaneous fluctuations in the utilization of oxygen by different animal and plant tissues were discovered.

Detailed investigation of these processes showed that a change in the functional state (caused, for example, by cooling) brought about similar changes in different types of vibrational activity.

An analysis of the phenomena which has been discovered formed the basis for a hypothesis of the automatic oscillatory nature of the regulation of life processes caused by feedback between the ultra-structural organization and the velocities of the catalytic processes coupled with it. It is suggested that automatic regulation is linked with a process of self-adjustment of the system in response to changing external conditions.

Doctor of Biological Sciences V. G. Samsonov gave a paper on the subject "Changes in the Frequency Spectrum of the Biological Currents in the Human Brain due to the Action of Flashing Light". A special analyzer of the biological currents in the brain was employed to reveal a number of peculiarities in the electrical activities of the human brain. Thus, it turned out that the brain was capable of distinguishing frequencies of flashing light to 160, not to 70 periods per second, as had been thought up to this time. The upper limit of perception of rhythms was determined by the brightness of the light stimulus.

A new, interesting phenomenon was discovered in the capacity of the human brain to reproduce two and even three simultaneous rhythms of flashing light which differed in frequency and whose frequencies were not multiples of each other, as well as the sum and the difference of their frequencies.



The paper given by Doctor of Biological Sciences A. S. Troshin "On the Basic Mechanisms of Permeability in Connection with the Problem of Excitation" presented the results of certain projects on problems of the permeability and the excitation of cells.

The speaker pointed out that asymmetry in the distribution of substances between the cells and the medium is created by differences in the capacity of substances to combine and dissolve in protoplasm. This gives rise to the conclusion that the higher the sorption capacity of a cell for a given substance, the greater the permeability of the cell for it. Such, as stated in the paper, are the mechanisms which regulate the permeability of cells in a state of rest (not excited and undamaged).

The second conclusion drawn by the speaker concerned the permeability of cells when excited. He considers that alterations in the protoplasm proteins constitute the "trigger mechanism" which causes the stream of biochemical reactions which are characteristic of the process of excitation. The biochemical reactions excited in this manner supply the energy required for functional activities in cells and serve as a source of energy for returning protoplasm from the excited state to a state of rest.

Thus, cellular permeability is regulated by changes in the properties of the protoplasm itself and the energy of metabolism is essential, from this point of view, for maintaining the given properties of the protoplasm on a certain level, not for the work of transport mechanisms concentrated in the cellular membrane as postulated by the membrane theory.

#### The Department of Technical Sciences

Academician A. A. Blagonravov reported on the basic results of the scientific and scientific organizational activities of the institutions of the Department of Technical Sciences during 1957-1959 before the General Meeting of the Department. He briefly described the most important results achieved in the basic fields from the standpoint of their significance in the further technological progress of the country, in increasing labor productivity, and in the effective utilization of energy and material resources in the national economy.

The Power Engineering Institute imeni G. M. Krzhizhanovskiy and the Institute of Electromechanics have completed the development of the scientific principles for a Unified Power System for the European part of the Soviet Union, its electric power balance, and the plans and structure of power lines based on attaining a level of 1,000 billion kilowatt-hours. A draft plan has been drawn up in the Institute of Electromechanics for a 750,000-kilowatt turbo-generator with liquid-cooled windings, and the calculations for it have been completed. The Engine Laboratory has conducted a number

of theoretical and experimental investigations on improving the efficiency of piston gasoline and gas engines, and of diesels and gas turbines. A great amount of experimental and desk work has been done on atomic power, chiefly on installations with water-moderated, water-cooled reactors and boiling water reactors.

Investigations of the power engineering use of fuels have been successfully developed. A new principle has been worked out on the basis of a study of the physical and chemical nature of coals in the plastic state for continuous coking which permits obtaining fuel from gaseous and poorly sintering coals which is not inferior in quality to metallurgical coke. A process of oxidizing pyrolysis for obtaining unsaturated hydrocarbons, which constitute a very important raw material for producing synthetic materials, from saturated hydrocarbons has been accepted for pilot plant testing.

A wide range of investigations has been completed with the objective of developing new and intensifying existing technological processes in the field of metallurgy and mining. General theoretical representations of the strength and the heat stability of solid bodies and a theory of the production of alloys have been developed in the Institute of Metallurgy imeni A. A. Baykov. New high-strength and special alloys based on iron and nickel, niobium, and titanium are being introduced into industry. A large complex of projects on the study of the general laws of the formation of semiconductor junctions and the technological application of semiconductors has been completed.

New principles for boring blasting holes have been suggested in the Institute of Mining. The data obtained on the shattering of rocks open wide prospects for the development of open-cut mining. A number of studies connected with exploiting the Kursk magnetic anomaly have been successfully completed.

Studies have been made in a number of institutes on the use of radioactive isotopes and nuclear radiation in scientific research and production processes. Methods for employing isotopes to solve certain engineering problems have been suggested.

Marked progress has been achieved in the development of a general theory of communications and a theory of radio relay and waveguide lines. Workers of the Institute of Radio Engineering and Electronics Institute have determined the absorption of radio waves by the upper layers of the atmosphere during observation of artificial earth satellites, and the elements of the orbit of the satellite were determined by displacement in signal frequencies. New results have been obtained in the Radio Engineering Institute on the use of radio electronics for accelerating elementary particles and the study of high-frequency phenomena in plasma. A theory of noise-stable codes has been worked out, and the conditions have been found for building communications systems with maximum performance in respect to method of reception and coding (Laboratory of Information Transmission Systems).

Among the more important results in the field of automatics and Telemechanics are the development of a theory of automatic control, new principles for building the technical means of automation and remote control, self-adjusting systems and dynamic programming (Institute of Automatics and Telemechanics). The problems of the theory of designing automatic machines and automated lines, and the automation of standardized production processes in machine building have achieved further development in the Institute of Machine Science.

A theory for the synthesis of digital computers of the differential analyzer type has been worked out in the Institute of Electromechanics. An automatic control system for a telescope with a 2.6-meter mirror now under construction is in experimental operation. The M-2 computer has been modernized, the M-3 high-speed digital computer is being introduced, and other controlling machines are under development in the Institute of Electronic Controlling Machines. The Institute of Mechanics has collaborated with industry to design an automatic electronic machine for programmed testing of the plastic properties of materials under complex stresses and loading.

Formulas have been derived in the Central Scientific Research Laboratory for Electrical Processing of Materials for calculating the characteristics of energy processes developed in electrode spaces during the instantaneous release of electrical energy.

A considerable amount of work was performed in field in which other departments of the Academy play a leading part. A number of important results were obtained by members of the Department who work in organizations outside the Academy.

The report devoted much attention to problems of coordination, training of cadre, publishing activities, and the strengthening of international scientific ties.

The work of the Department showed serious shortcomings along with the successes that were achieved. These shortcomings were pointed out in the report and also in the speeches made by some participants in the meeting: Academicians I. I. Artobolevskiy, A. I. Berg, N. G. Bruyevich, B. S. Stechkin; Corresponding Members of the Academy of Sciences USSR A. Ye. Alekseyev, A. N. Larionov, and N. V. Mel'nikov.

First of all, despite the concentration of attention on subjects determined by the basic objectives, one still encounters projects in the plans of the institutes which relate to secondary matters. These projects are not urgent and are weakly connected with the prospects of the development of the national economy.

The activities of the scientific councils on leading problems have not as yet become the basic form of coordination and have been limited mainly to discussions of plans for joint projects. There are shortcomings in the training of scientific cadre and in maintaining a material base in a number of the institutions of the Department.

Publishing activities have been expanded, but many scientific establishments are lagging in fulfilling their plans for preparation of manuscripts.

The remarks made in the speeches concerning the definitions of the chief objectives and the place of the Department of Technical Sciences in the system of the Academy and its role in promoting technological progress, as well as the suggestions made for improving the work of the Department were reflected in the decisions adopted by the meeting.

The General Meeting approved the good work done by the Bureau of the Department with the purpose of further development and strengthening of scientific research, and acknowledged that it was correct to concentrate efforts on the basic fields and on projects conducted jointly with establishments of other Departments on the mastering of cosmic space, the development of aviation, the peaceful use of atomic energy, etc..

In noting the fruitful activities of Department members in establishments outside the Academy, the Meeting recognized that it is necessary to receive periodic information on their projects.

A number of organizational measures were outlined which were directed toward freeing the plans for scientific research from secondary subjects and projects of an ancillary nature, toward adjusting the structure of the institutions of the Department in accordance with the objectives and the plans of the most important scientific projects, toward improving coordination and ensuring the most rapid introduction of results into practice, and toward processing the materials gained by our scientists on trips abroad.

The report given by Academician I. I. Artobolevskiy before the General Meeting was devoted to the problem of organizing the propaganda of scientific and technical knowledge. As noted in the report, the workers of the Department of Technical Sciences are not devoting sufficient attention to these problems and are not propagandizing the modern achievements of new technology. Although many of the workers of the scientific establishments of the Department are participating in the work of the All-Union Society for the Promotion of Political and Scientific Knowledge, the general mass of scientific workers have not been drawn into this work. The primary cells of this Society are few in number in several of the institutes and there are absolutely none in some institutes. In the meantime, the propaganda of scientific and technical knowledge and constant contact with the Society constitute an unalterable condition for making the masses of the people widely acquainted with the newest achievements of science. The visits made by groups of scientists sent out to factories and enterprises, and the combination of lectures with consultations on various technical problems which are taking place in Moscow and Leningrad can serve as an example of a successful beginning in this direction.

After discussing the report by I. I. Artobolevskiy, the General Meeting resolved to consider activities connected with propagandizing scientific knowledge to be a most important task for scientific workers and outlined concrete measures for activating work in this direction.

The final session of the General Meeting was devoted to organizational problems.

Elections were held as the scientific secretary of the Department, his deputy, and the members of the Bureau had reached the end of their terms in office. Academician A. A. Blagonravov was elected Scientific Secretary of the Department of Technical Sciences and Academician L. L. Shevyakov and Corresponding Member of the Academy of Sciences USSR B. N. Petrov were elected to be his deputies. The following were elected to the Bureau: Academicians I. I. Artobolevskiy, A. I. Berg, A. A. Bochvar, S. A. Vekshinskiy, V. P. Glushko, V. I. Dikushin, M. P. Kostenko, V. S. Kulebakin, A. L. Mints, G. I. Petrov; Corresponding Members of the Academy of Sciences USSR H. A. Dollezhal', and A. M. Samarin.

#### The Department of Historical Sciences

Academician Ye. M. Zhukov gave the report on the work of the Department of Historical Sciences in 1959 before the General Meeting of the Department. He stated that the scientific institutions of the Department had intensified their concentration on the most urgent sections of historical science -- those of the history of Soviet society, the most recent history of foreign nations, including the nations of Asia and Africa.

The speaker named the most important works by historians during the past year. He noted in particular the monographs prepared for the 90th anniversary of V. I. Lenin by the scientific workers of the Institute of History E. B. Genkina, S. I. Yakubovskaya, and I. S. Smirnov which throws light on various aspects of and stages in the activities of the great leader of the October Revolution. The speaker pointed out that the heroic struggles of the Soviet people during World War II, the history and the contemporary development of the peoples of the Soviet Union, and the history of Soviet culture had been examined in a number of the books which had been published. A significant place in the work of the historians was occupied by the field connected with the struggle against vestiges of religion. Historians have started work on multivolume fundamental publications -- Istoriya SSSR epokhi sotsializma [The History of the USSR during the Epoch of Socialism] and the Istoriya Velikoy Oktyabr'skoy sotsialisticheskoy revolyutsii [The History of the Great October Socialist Revolution].

The textbook Noveyshaya istoriya stran Zapadnoy Evropy i Ameriki T. I. 1918-1939 gg. [The Recent History of the Nations of Western Europe and America, Vol. 1. 1918-1939] (Institute of History); Ocherki istorii Kitaya v noveysheye vremya [Sketches of the History of China in Recent Times] (Institute of Sinology); Noveyshaya istoriya Indii [A Recent History of India] (Institute of Oriental Studies) are significant general works in the field of modern history. The next volumes of Istoriya Chekhoslovakii [History of Czechoslovakia], Ocherki po istorii SShA [Sketches on the History of the United States], and the eighth volume of Vsemirnaya istoriya [World History], which is devoted to the years of the revolutionary crisis -- 1919-1923, have been prepared for printing. The continuing monographical development of many of the important problems of modern history is evidenced by the publication of a number of large studies relating to this period.

A concrete analysis of these works, their merits and shortcomings, occupied a large place in the report.

Ye. M. Zhukov emphasized that a certain increase in the share of the works dealing with the problems of history closest to our own times still does not mean that one can be satisfied with the existing situation in historical science. There is still a great disproportion between the number of studies devoted to the problems of most recent history and the works which describe farther removed epochs in the history of mankind. It is impossible to consider as normal the fact that the overwhelming majority of the specialists of the highest skills -- the academicians, the corresponding members of the Academy of Sciences USSR and the Doctors of Science -- work in the fields of ancient, medieval, and recent history.

Passing on to a description of the works on history of epochs farther removed from our times, Ye. M. Zhukov first discussed the studies and publications of documents on the history of our Motherland. The works he mentioned included the book by Yu. Z. Polevoy Zarozhdeniye marksizma v Rossii [The Origin of Marxism in Russia], the fourth volume of the Istoriya russkogo iskusstva [History of Russian Art], being edited by Academician I. E. Grabar', and the publication Vologodsko-Permskoy letopisi [The Vologda-Perm' Chronicles], being edited by Academician M. N. Tikhomirov and others. Of the books which are ready for printing, he stated that the most interesting are the second volume of Istoriya istoricheskoy nauki [The History of Historical Science] (Academician M. B. Nechkina is the head of the group of authors), and three issues of the Svod arkheologicheskikh istochnikov SSSR [Compendium of Archeological Sources of the USSR] (edited by Academician B. A. Rybakov). Important monographs on different problems of general history which were also mentioned in the report were written by Academician V. P. Volgin,

Doctors of Historical Sciences I. M. Dyakonov, S. L. Tikhvinskiy, V. M. Shteyn, D. A. Ol'derogge, collective works of ethnographers, the publications Protokoly Parizhskoy kommuny [Protocols of the Paris Commune], and others.

Speaking further on the objectives of the Department and its institutes in connection with the decisions of the Central Committee, CPSU in regard to the objectives of Party propaganda under modern conditions, Ye. M. Zhukov emphasized in particular the need for mobilizing the efforts of scientists to develop politically acute themes and to turn away completely from aimless collection of facts. Ye. M. Zhukov stated that Soviet historians must help in the cause of indoctrinating our people in the spirit of communism, in the spirit of internationalism, and in Soviet patriotism. The solution of the tasks connected with the decrees of the Central Committee, CPSU must be achieved in especially close contact with the scientific institutions of other humanities departments of the Academy.

Ye. M. Zhukov criticized the work of the journal Voprosy istorii [Problems of History], which, he noted, does not satisfy the historical community. Voprosy istorii should be converted into a genuine theoretical journal of Soviet historical science.

In conclusion, the speaker stated that during the current year Soviet historians will have to participate actively in a number of large international scientific congresses: the Congress of Orientologists to be held in Moscow, the Congress of Historians in Stockholm, and the Paris Congress of Ethnographers. This will give them important additional obligations.

An analysis of the work done by the Department and the tasks facing it was continued in speeches by the deputy scientific secretary, Doctor of Historical Sciences B. I. Shunkov and Corresponding Members of the Academy of Sciences USSR B. M. Khvostov and A. A. Guber.

V. I. Shunkov discussed the problems of planning the development of historical sciences. In defining the most important fields for study, he stated that the Department had succeeded in strengthening the development of the problems of the history of the struggle for socialism and communism in the USSR, the building of socialism in the people's democracies, a more thorough investigation of the processes which take place in bourgeois countries under the conditions of the general crisis of capitalism, and study of the popular movements for freedom in the countries of Asia, Africa, and Latin America. Moreover, the attention of scientists was directed to subjects of importance in perceiving the laws of the development of human society connected with the revolutionary traditions of peoples and with the requirements of the struggle with reactionary bourgeois historiography. The duty of Soviet historians is to assist in disseminating scientific ideas of the historical process among the wide masses of the people

of the capitalist countries; this gives rise to the need for including in the work plans of the institutes the writing of works, with priority given the history of the USSR, specially designed for foreign readers.

Experience has shown that reducing the number of personal and individual monographs by introducing forms of collective work, and the development of the work of the scientific councils on problems and creative groups for studying individual nations and problems have been favorable factors in the scientific-organizational activities of the Department.

However, there is still much to do in respect to the proper planning of the work of historians. Not all of the scientific councils and creative groups have developed their activities to the proper degree.

The speech by V. M. Khvostov was devoted to the international ties of the institutes of the Department. He stated that the ties with the historians of the people's democracies have become an organic part of the work of the institutes. During the past year documents and materials were prepared for publication with the collaboration of Bulgarian specialists on the history of the Russo-Turkish War of 1877-1878 and the liberation of Bulgaria, and materials were collected for the Atlas bolgarskogo yazyka [Atlas of the Bulgarian Language]; in collaboration with Polish colleagues, the preparation of documents and materials for a multivolume edition of the history of the Polish Revolution of 1863; and with Albanian archeologists, the excavation of Apollonia Illyria and the study of a number of other monuments of antiquity. Czech and Soviet historians of culture have continued their collaboration on the collected works Voprosy razvitiya i vzaimosvyazi russkogo i chekhoslovatskogo iskusstva [Problems of the Development and the Mutual Ties of Russian and Czechoslovakian Art]; and Soviet and Chinese scientists on the work Muzykal'naya i teatral'naya kul'tura sovermennogo Kitaya [The Musical and Theatrical Culture of Modern China]. The preparation of documents on the history of Russian-Rumanian relations for publications is continuing (jointly with the Academy of the Rumanian People's Republic). A number of scientists from various socialist countries have been drawn into the work on the ethnographic series Narody mira [Peoples of the World].

V. M. Khvostov presented data on the participation of Soviet historians in international scientific conferences, meetings, and symposia and on the publication of scientific works by Soviet research workers abroad and those of foreign scientists in the USSR. He stated that it was unfortunate that the number of foreign missions last year for work in archives and libraries was extremely inadequate and that little had been done to propagandize Marxist-Leninist historical science abroad.



The debate which followed touched upon the problems of concern to the scientists -- improving coordination in scientific work, training personnel, popularizing historical knowledge, and the situation with respect to publication of the works of historians.

Corresponding Member of the Academy of Sciences USSR B. N. Ponomarev examined in detail the problem of the work of historians on the implementation of the decisions of the Central Committee of the CPSU and on the tasks of Party propaganda under modern conditions. After pointing out that, due to the growth in the international stature of our country, its experience and its history were arousing great interest in both the socialist and in the capitalist countries, he offered a number of suggestions on improving the work of familiarizing foreign readers with the results of research done by Soviet historians.

The activities of the Publishing House of the Academy of Sciences and the book trading organizations (first and foremost,) Akademkniga [Publishing House of the Academy of Sciences] were sharply criticized by Academicians I. I. Mints, M. N. Tikhomirov and Corresponding Member of the Academy of Sciences, USSR A. A. Guber. A. A. Guber stated that the possibilities for publishing scientific works of the institutes had increased markedly of late and would practically permit the printing of all works worthy of publication; but the books on history are published with inexcusably small circulations, thus not reaching the readers. A. A. Guber and M. N. Tikhomirov, as well as Corresponding Member of the Academy of Sciences USSR N. V. Pigulevskaya spoke of the importance of recruiting great scientists into writing popular science books on history. Ideas on improving the coordination of the work of historians with that of philosophers, economists, and philologists occupied a large place in the speech given by I. I. Mints.

Corresponding Member of the Academy of Sciences USSR Kh. Kh. Krus devoted his speech to the development of historical area studies in our country and its problems, and M. V. Andrianova spoke on revising the work of the Museum of the History of Religion and Atheism. Academician S. D. Skazkin raised the question of the need for inviting scientists from the people's democracies to scientific conferences of Soviet historians.

Two scientific papers were given at the Annual Meeting.

Academician B. A. Rybakov presented a paper on "The Russian Epos in an Historical Light". The speaker pointed out that those splendid monuments of the people's creativeness -- the Russian epos -- which have come down to us expressed real events, in addition to their poetic fiction, and gave impressions of historical figures who really existed. Although the chronicles express those views of the history of Russia which prevailed in boyar-princely and noble circles, one may find in a careful analysis of the Russian epos an expression of ancient Russian history from the people themselves.

The speaker believes that the historical analysis of the epos has been inadequate in Soviet science, for after justifiably condemning the errors of the pre-revolutionary Russian folklorist of the so-called "historical school", the modern students of the ancient Russian epos incorrectly rejected its historical significance in general.

Throughout the whole of his paper, B. A. Rybakov disputed the views of the well known Soviet folklorist V. Ya. Propp and expressed his disagreement with Propp's position on the rise of the epos in princely-aristocratic circles and on the late (15th Century) appearance of the epos of the valiant peasant Mikula Selyaninovich and the "northern" origin of many epos, etc..

Using a number of examples, the speaker developed a broad argumentation in favor of his proposition that there were real historical prototypes of many heroes of the epos, that the epos told of Russian cities known in the chronicles, etc.. By comparing the chronicle and epos texts, B. A. Rybakov proved that the latter described in poetic form different historical events, for example, the famous Kievan uprising of 1068, the struggle of Prince Oleg Svyatoslavovich with the Varangian commander Svengel'd and his people, the fortunate deliverance of Kiev from the Tatars in the summer of 1239, etc..

In examining the problem of the influence of feudal court poetry on the epos, B. A. Rybakov emphasized that only a few of them had been subjected to such influences.

In conclusion, B. A. Rybakov stated his own ideas on the periods of the Russian epos.

The paper "On the Significance of Soviet Experience in Building Socialism for the Development of Scientific Communism" was given by Doctor of Historical Sciences M. P. Kim.

He stated that the Marxist-Leninist teachings has resulted from a generalization of the experience of history. V. I. Lenin developed Marxism on an irrefutable basis of historical experience and formulated new propositions and conclusions in the new epoch of the development of society. The modern epoch in social development with its new and very rich experience marks a new stage in the development of Marxist-Leninist teachings. Soviet experience in the struggle for a new social structure was the first practical experience in international communism. This experience confirmed the laws of development of socialism formulated in the Declaration of the Communist and Worker Parties (1957) and also bore witness to the specific peculiarities connected with the concrete-historical conditions of the struggle for socialism of the path to socialism which was taken by our country.

The essential nature of certain general laws which were confirmed by the experience of the socialist revolution and the building of communism in the USSR was described in detail in the paper. Moreover,

the speaker devoted a great deal of attention to the meaning of specific features of the development of socialism in the USSR which were caused by the relative backwardness of the country at the time building of socialism was started, by the necessity for many of the peoples of the USSR to complete the transition to socialism without having experienced capitalism, and also by the fact that socialism in the USSR was built under conditions of hostile capitalist encirclement. M. P. Kim stated further that the struggle of the Soviet people for socialism and communism not only confirmed the conclusions of Marxism-Leninism, but also permitted the Communist Party to discover new laws of social development. The paper elucidated among these laws the growing creative activity of the masses, the need for material stimuli for work during the building of socialism and communism, the development of socialistic competition, and others. M. P. Kim also analyzed the experience of the cultural revolution, the winning of the intelligentsia to the building of socialism, the significance of the contribution made by the Communist Party in solving the problem of ways and forms of the transition from socialism to communism and in establishing the principle of peaceful coexistence with capitalist countries.

Elections were held at the meeting to select members of the Bureau of the Department. The following were elected for new terms: Academicians I. E. Grabar', B. A. Rybakov, V. V. Struve, M. N. Tikhomirov; Corresponding Members of the Academy of Sciences USSR B. G. Gafurov, S. P. Tolstov, P. N. Tret'yakov. Corresponding Member of the Academy of Sciences, USSR S. V. Kiselev was also elected to membership in the Bureau of the Department.

The meeting decided to award the scientific degree of Doctor of Historical Sciences honoris causa to the Director of Archives of the Academy of Sciences USSR G. A. Knyazev.

#### The Department of Economic, Philosophical, and Legal Sciences

The General Meeting of the Department of Economic, Philosophical, and Legal Sciences was opened by a scientific paper by Corresponding Member of the Academy of Sciences USSR V. N. Starovskiy "On a Method for Comparing the Economic Indices of the USSR and the United States". The speaker pointed out that such a comparison has acquired great importance in view of the growing struggle of the Soviet people to solve fundamental economic problems. A number of valuable studies carried out in recent times by the Central Statistical Administration under the Council of Ministers USSR, scientific establishments, and individual Soviet scientists have been devoted to the problems of the economic competition of the USSR and the United States. American economists have also devoted much attention to these problems and have tried to falsify the

the facts in the majority of cases; however, the works of some American scientists show a tendency to give a more sober evaluation of the progress of Soviet economy.

V. N. Starovskiy presented basic comparative figures on the ratio of the levels and rates of growth of industry in the USSR and in the United States and showed how sharply this ratio has changed during the years of the Soviet regime.

In comparing the economic indices of the USSR and the United States, it is essential to cope with certain difficulties connected with differences in the methods of accounting practice in Soviet and American statistics.

The indices of industrial production are derived in different ways in the USSR and the United States. Soviet statistics are based in this case on overall accounting of all types of production in natural terms. Americans, not having a sufficient amount of direct figures at their disposal, make use of indirect indices. In a number of instances, the differences between the Soviet and the American methods of accounting are explained by a fundamentally different theoretical approach (for example, in deriving indices of the national income, the level of the standard of living, etc.).

V. N. Starovskiy discussed further the ratios of the levels of production in both countries in different branches of industry and the levels achieved in labor productivity; he also presented figures characterizing these ratios. He stated that the Central Statistical Administration under the Council of Ministers USSR had calculated the cost of gross national products of the United States and the Soviet Union in comparable prices (in rubles and dollars), and also of net production. All methods yielded approximately the same conclusions on the ratio of levels of industrial production in the USSR and in the United States.

The speaker exposed the flimsiness of the statements made by A. Dulles and other American political figures and economists to the effect that an "official myth" of the exceedingly great backwardness of pre-revolutionary Russia had been created in the USSR in order to emphasize modern achievements. American statisticians have also grossly distorted figures on the rates of growth of Soviet industry as compared with 1913.

V. N. Starovskiy also presented comparative statistical figures on the volume of production and labor productivity in the agriculture of both countries and gave an analysis of the levels, the structure, and the ratios of the national incomes. In concluding, he told of the important work done in recent years in the field of methodology of economic comparisons by agencies of the Council of Mutual Economic Assistance of the socialist countries.

Corresponding Member of the Academy of Sciences USSR P. N. Fedoseyev presented the report on the work of the Department. Since a written report had been sent out previously to the members of the

Department and to the institutes, the speaker merely gave a brief description of the most important items in the work that had been done and concentrated his attention primarily on the objectives of further investigations. P. N. Fedoseyev emphasized that, being guided by the decisions of the Twenty-First Congress of the CPSU and the subsequent decisions of the Communist Party and the Soviet government and endeavoring to overcome the material shortcomings of their work in the past, the institutes of the Department had achieved some progress in their activities. In 1959 the institutes undertook to work out a number of concrete problems connected with the establishment of a material-technical base for communism, further technical progress, the solution of the basic economic problems of the USSR, raising the productivity of labor, the improvement of the distribution of socialist production, the development of socialist democracy, and the development of the Marxist-Leninist philosophy under contemporary conditions. The ties between the scientific research and scientific-propagandistic work of the institutes and the practical building of communism were markedly strengthened on this basis. Contact was achieved between the Institute of Economics and the planning agencies of our State; scientific reports were prepared in the Institute on a number of important problems in the development of the national economy; a standardized procedure for determining the economic effectiveness of capital investments was developed and put into practice; studies made by the economists were supported by a large amount of factual material, including statistical data. The surveys compiled by the Institute of World Economics and International Relations are of material importance in promoting understanding of the processes which are going on in the capitalist countries and in the countries where nationalistic liberation movements have developed. The Institutes of Law, Philosophy, and Economics have undertaken useful generalizing works on the theoretical problems of communism. Textbooks recently published which have had wide circulation are: Politicheskaya ekonomiya [Political Economy] (Third edition), Osnovy marksistskoy filosofii [The Principles of Marxist Philosophy] (Supplemented edition), and others; also such works as the third and fourth volumes of the Istoriya filosofii [History of Philosophy], the three-volume S"yezdy Sovetov SSSR, soyuznykh i avtonomnykh respublik (1917-1936) v dokumentakh [Sessions of the Soviets of the USSR, Union, and Autonomous Republics (1917-1936) in Documents] have had wide circulation. Collections of articles devoted to the struggle with bourgeois ideology, reformism, and modern revisionism have been published.

New obligations in respect to elevating the theoretical level of investigations have been set for Soviet philosophers, economists, and lawyers by the recent decrees of the Central Committee CPSU on the objectives of Party propaganda under contemporary conditions.

The preparation of a joint fundamental work in which the laws of the development of socialist society and its growth into communism would be examined in a generalized form should be the chief task of the institutes of the Department in the near future. The speaker stated that the shift to urgent problems does not mean that the institutes should turn to subjects of a limited character -- it is essential that they concentrate their attention on the chief, fundamental problems.

It would be improper if scientists were to reject study of the history of social thought and the history of the national economy in striving to make their studies more urgent. We are talking of changing from the preparation of monographs on individual problems (this matter has now been essentially settled) to the production of generalizing works which give a Marxist interpretation to the processes of the development of the spiritual life of mankind and to the history of the national economy.

In examining the problems of the organization of scientific research, P. N. Fedoseyev emphasized the necessity for the further introduction of collectivized forms of work, the avoidance of multiple subjects, the proper combination of the work of sectors and creative groups, the improvement of the coordination of the activities of scientists and scientific institutions, the activation of the work of scientific councils and associations, improving the quality of the journals of the Department, and strengthening the ties between the institutes and the All-Union Society for the Propagation of Political and Scientific Knowledge. The speaker suggested that a special scientific council be established to study the natural laws of the socialist society, that an Institute of Statistics be set up in the Academy, and also introduced a number of suggestions directed toward improving personnel training.

Many concepts on the tasks of Soviet socialized science and a number of criticisms in regard to the activities of the Department and its institutes were expressed in the debates on the report.

In opening the debates, Academician S. G. Strumilin criticized the report given before the Meeting for its lack of information on the work done the preceding year by individual members of the Department. He emphasized that the academicians and the corresponding members of the Academy of Sciences USSR should constantly be active in science and form the vanguard of Soviet science.

Corresponding Members of the Academy of Sciences USSR P. S. Romashkin and A. I. Pashkov gave examples of serious defects in the coordination of scientific research and other shortcomings in the organization of scientific projects which have not yet been overcome -- examples which they encountered in their special fields of science. Academician V. S. Nemchinov, Doctor of Economic Sciences K. N. Plotnikov, and Doctor of Philosophical Sciences I. I. Matveyenkov also touched on this subject in their speeches. All of them offered concrete

suggestions for improving organization and elevating the scientific level of research. Corresponding Member of the Academy of Sciences USSR M. T. Iovchuk directed attention toward the need for intensifying work in the field of the study of the Leninist stage in the development of the philosophy of Marxism; he also criticized bourgeois philosophy and sociology and raised the question of establishing a network of institutes dealing with the humanities in the large centers of the country, in particular, in Leningrad and under the Siberian Department of the Academy.

A lively exchange of opinions in which Academicians Ye. S. Varga and V. S. Nemchinov, Corresponding Members of the Academy of Sciences USSR A. I. Pashkov, V. N. Starovskiy, L. V. Kantorovich, T. S. Khachaturov, Doctor of Economic Sciences Ya. A. Kronrod and also P. N. Fedoseyev, who gave the last speech, participated, dealt with the question of the application of mathematical methods in economic studies. Directing attention to the importance and the practical usefulness of these methods, the participants in the debate pointed out that their application should be conducted in accordance with the principles of Marxist theory and emphasized the inadmissibility of the penetration of the influence of the bourgeois "econometrics" into Soviet economic science.

The resolutions on the report to the Department that were adopted formulated the principal tasks of future work in the fields of economic, philosophical, and juridical sciences and contained a number of suggestions of a scientific-organizational nature.

#### The Department of Literature and Language

The report on the activities of the Department of Literature and Language in 1959 was given by Academician V. V. Vinogradov before the General Meeting of the Department.

The speaker stated that Soviet literature and linguistics, like all our science, developed during the past year under the favorable influence of the historic decisions of the Twenty-First Congress of the CPSU.

Literary criticism has been characterized by endeavors to solve the urgent problems of literary life and intensified attention to theoretical problems whose development is directly connected with the struggle against foreign bourgeois and revisionist concepts, in particular, against the structuralism which has been activated recently and which isolates literature from historical reality. Studies which throw light on the stages of development of realism and socialist realism have been advanced to the foreground. The problems of the laws of the occurrence and the historical development of national literatures and their ties and inter-relationships were carefully worked out.

The work on the general theory of Marxist literary criticism must be made more profound. Studies in the field of comparative-historical literary criticism based on the Marxist theory of development of social phenomena and the forms of social consciousness have thus far been weakly developed.

There are no new great works on the problems of poetry or the theory and history of literary styles.

Measures have been taken in the field of linguistics to intensify research in the theory of Soviet linguistics.

A large amount of interesting work was done on descriptive and historical linguistics in 1959. A certain activation of research in the field of comparative-historical linguistics was noted.

Development of the theoretical problems of general linguistics continues to remain the weakest sector in our linguistic studies. The study of the problems of applied linguistics should also be accelerated. There are no long-term investigations of the application of mathematical methods and probability methods to the study of the phenomena of language. It is necessary to initiate systematic projects on structural analysis.

After elucidating the activities of the Bureau of the Department, in particular its participation in the preparation of generalized works and in coordination work, V. V. Vinogradov concluded by discussing the long-term plan for studies in the field of literary criticism and linguistics in the near future.

As a result of a great deal of work the following long-term fields were derived: the theory of Soviet linguistics; the historical and comparative-historical study of families and groups of languages; the laws of development of related conversational and literary languages (in connection with the history of dialects); the typological study of modern languages; the basic problems of semantics, the theory of information and applied linguistics (an interdepartmental field); the theory of Marxist literary criticism; the development of literature of socialist realism, its role in the communist indoctrination of the people, and its ties with the classical heritage; the laws of the historical development of national literatures; the historical development of world literature; realism and the stages of its historical development; and the history and theory of popular poetic creativity.

Corresponding Members of the Academy of Sciences USSR D. D. Blagoy and D. S. Likhachev, Doctors of Philological Sciences N. L. Stepanov, M. M. Gukhman, and Yu. D. Desheriyev participated in discussing the report.

D. D. Blagoy devoted a large part of his speech to the book by V. V. Vinogradov O yazyke khudozhestvennoy literatury [On the Language of Artistic Literature]. N. L. Stepanov raised the question of publishing collected scientific articles and the organization of a journal of literary criticism. D. S. Likhachev's speech was devoted



to the training of young specialists. M. M. Gukhman noted the lack of organized forms of collaboration with the institutes of other departments in working out problems of the general theory of Soviet linguistics and the need for participating in studies on some subjects under investigation by workers in institutions of higher learning. Yu. D. Desheriyev suggested that special linguistic expeditions be organized to study the languages of the world.

Doctor of Philological Sciences R. M. Samarin presented the scientific paper "The Problem of Realism in Contemporary German Literature".

In speaking of the slow development in the second half of the 19th Century which was characteristic of German realism, the speaker pointed out that it was in the 20th Century that the greatest German realist writers appeared.

Socialistic realism was formed along with a vigorous development of critical realism in German literature in the 1920's. At that time, however, these two lines of realistic literature in Germany were estranged from each other, which had a negative effect on the development of realism as a whole. Their union was achieved in the 1930's and 1940's when German emigree writers united their efforts in the struggle against Nazism for the preservation and further existence of humanistic German literature, even though they retained the differences in their political and esthetic views.

In analyzing the path taken by German literature after 1945, the speaker noted that literature of the German Democratic Republic is developing under the banner of socialist realism. The works of such authors as B. Brecht, J. Becher, and A. Segers have received world recognition. Old masters of critical realism, for example, A. Zweir, are also participating in the creation of a new German literature. The development of realistic art is becoming more and more difficult in the literature of The Federal Republic of Germany due to general political factors which stimulate literature toward a revival of fascism and to the significant activity of various decadent trends. Nevertheless, the endeavor to reflect on the lessons of history and ways for the further development of the German people are characteristic of the realistic literary works of both German States -- they oppose the decadent and the fascist tendencies in West German literature.

Then Corresponding Member of the Academy of Sciences USSR B. A. Serebrennikov gave a report on the participation of scientists from the Department in the work of the All-Union Society for the Promotion of Political and Scientific Knowledge.

B. A. Serebrennikov stated that the propaganda of scientific knowledge is an integral part of the general propaganda work carried out by our Party. Therefore, the basic propositions of the decisions of the Central Committee of the CPSU "On the Tasks of Party Propaganda under Modern Conditions" apply with equal force to our scientists who are carrying out propaganda of scientific knowledge.

After telling of measures which have already been adopted by some institutes belonging to the Department in order to improve the propaganda of scientific knowledge, the speaker pointed out the necessity for wide discussion of this problem in order to offer concrete suggestions to the Society.

In addition, elections for the scientific secretary and the Bureau of the Department were held at the meeting. Academician V. V. Vinogradov was elected scientific secretary. The following were elected to the Bureau: Academicians M. P. Alekseyev, A. I. Beletskiy, N. I. Konrad, I. I. Meshchaninov, K. A. Fedin; Corresponding Members of the Academy of Sciences USSR V. I. Barkovskiy, S. G. Barkhudarov (deputy scientific secretary), N. F. Bel'chikov, D. D. Blagoy, A. K. Borovkov, V. M. Zhirmunskiy, D. S. Likhachev, B. A. Serebrennikov (deputy scientific secretary), M. B. Khrapchenko (deputy scientific secretary), and Doctors of Philological Sciences I. I. Anisimov and A. S. Bushmin.

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